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approach

US NAVY

An Editorial . . . Aviation Safety: World War I Vintage

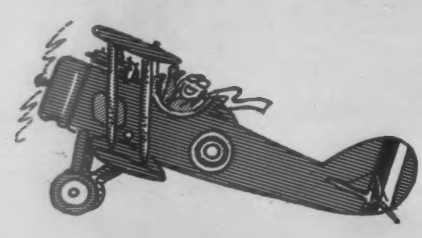
This is the month we honor American veterans from all our wars (Veterans Day, November 11). We started doing this after World War I, a few of you may recall. That was a long time ago and things have really changed in the aviation safety world — or have they?

We came across a copy of a letter written 66 years ago in the spring of 1918 by an American pilot flying combat in France. We expected to learn a lot of things about the dangers in flying those rickety World War I planes — a far cry from our sophisticated high tech, supersonic, computerized, combat craft of today.

In a letter to his father, the pilot wrote:

> "You asked about the dangers of flying and the number of mishaps that occur over here that result in fatal injuries. Relatively few of our craft are destroyed by enemy action. Complacency or a false sense of adequacy causes more crashes than any other factor. Aviators attempt unauthorized maneuvers, run out of fuel, become disoriented or lost, fly low-level and crash into obstacles or attempt takeoffs or landings that are not within the capability of their aircraft.
>
> "The craft that we fly are relatively safe. In most cases, prior planning and professional competence normally result in a safe landing if a mechanical malfunction occurs. The loss of aircraft to the enemy is an accepted risk and is the nature of war, but at times it's difficult to understand why — with the inherent risks of combat always present — our aviators make such stupid mistakes. That is the only way to describe them — stupid mistakes!
>
> "I imagine that as long as man experiences the exhilaration and the freedom of flight and the need to foolishly exhibit his manhood and master of his machine, accidents will continue. A competent aviator must realize both his own and his aircraft's capabilities and limitations, especially in a combat situation. A loss of an aircraft, whether by enemy action or by accident, is still a loss to our cause. To better answer your question, no, it is not dangerous to fly. Our machines are adequate. It is the human who is dangerous. Best to mom and the family and, hopefully, I'll be coming home soon."

He did. You will, too, if you think the way he did. Happy Veterans Day!



inside approach

Vol. 30 No. 4

T-34Cs fly a formation hop over Pensacola. (Photo by Peter Mersky)

FEATURES

DEPARTMENTS

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BRader

... the suction of the water filling into the aircraft cabin was pulling me back in. In one horrifying moment, I found myself back in the helicopter, beneath the surface, shut off from the air and the light.

My Time

By Capt. Bert B. Tussing, USMC
HMH-461

We had been flying since 0420 that morning, a part of a rehearsal exercise for one of those huge, interservice efforts. The first shutdown time had been 0751. The CO was occupied with debriefing the powers that be on what should have happened that didn't and what did happen that shouldn't. My copilot and I along with the crews of the other three aircraft in the flight ducked below decks and gratefully consumed the boxed breakfast supplied by the mess decks and returned to the rack. After all, we had briefed at 0200 and even having gotten to bed at 1830 the night before, we figured rest was the next order of the day. Following that would be at least another three-to-five hours of flying.

At 0930 we were up again, getting ready for the 1000 debrief/brief. The skipper had returned with all of the new gouge. The new plan called for an additional fun-filled hour of delta time over our ship after our simulated troop pickup from an LPH.* As per the standard on any shipboard operation, my copilot and I were on the deck a full 30 minutes prior to the time we were supposed to spread the rotor blades, standing by. We took the time to talk a little about how things had run in the early morning launch and to rebrief how we were going to play through the afternoon. For the most part, both of us had been pretty pleased with the way things had run for us and our crew in the wee hours ... in spite of our initial trepidation with Ol' Number Seven.

Now, Number Seven had not been a bad flying machine for the launch; pretty smooth, in fact. But that isn't to say she didn't give us reason to pause before we left. She had been a perennial "stable queen" among the Sea Stallions. In recent memory, Old Seven had always been the one (or at least one of the ones) we really had to stroke before any major operation. This isn't to say the crew chief was to blame. This particular sergeant was one of that grimy breed who knows the airplane with an intimacy that draws them to a plane until it is either well or K-balled beyond recognition. The sergeant had pleaded Seven's case sufficiently to prevent her from becoming a parts bin and had made the aircraft a reasonably safe, smooth flying creature, but she still had her quirks . . . .

And the quirks bothered me. One had to do with an irritating propensity Seven had for "winking" a flight ready light at you. This is not particularly uncommon for a Stallion with its elastomeric rotorhead on board a radar/radio platform certain HF signals release "gremlins" in the logic unit. Ole Sarge assured me that there was nothing wrong with this part of the helicopter that a new wire bundle (which we didn't have, 'natch) wouldn't fix. But I've always been less than anxious to fly a bird whose caution lights are waving the not-safe-for-flight banner in my eyes. QA joined in the "but it's still safe to fly" chorus, and I finally succumbed. Before you Lazyboy quarterbacks deposit your Delta Sierra ballots for yours truly ... the call was good. The aircraft, from all that could be determined, was safe for flight, and the rotorhead had nothing to do with our eventual catastrophe.

There was one other "quirk," however, that caused me even more concern. The discrepancy book had warned against it, and preflight bore it out: The copilot's cyclic was out of alignment. When the flight controls were neutralized, the pilot's stick was standing up straight and pretty, just like all good cyclics were raised to do, but the copilot's canted slightly to the left. In my infinite knowledge of the H-53 and its systems, I realized immediately that this was not according to Hoyle and said as much to Ol' Sarge. But, like a protective mother, he plaintively appealed for the bird, explaining that she had been that way for some time now, the whole thing was just a mattter of a *slight* mechanical

*amphibious assault ship

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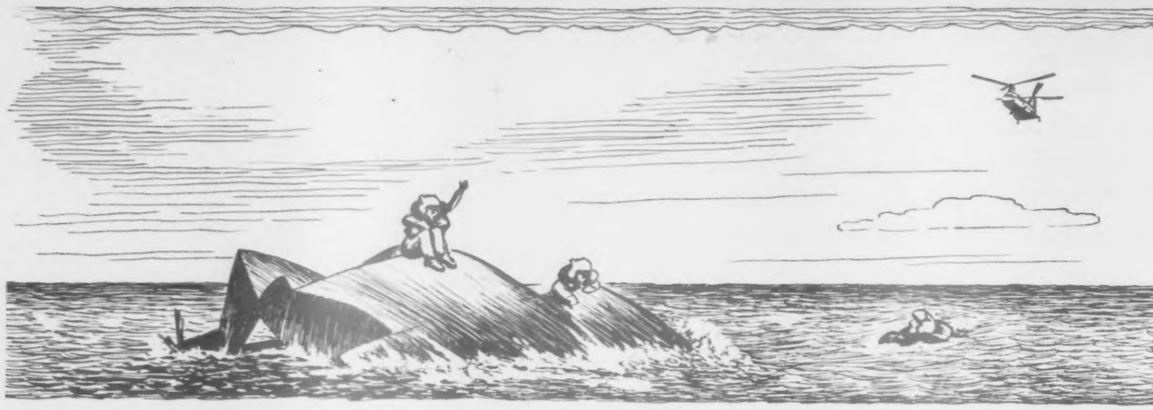


misalignment, and the condition certainly had nothing to do with jeopardizing the safety of flight. QA joined in on the refrain, and I surrendered, satisfied once again with a reasonable explanation.

So, Okay . . . Seven wasn't exactly your premier VIP vehicle, but performance had backed up mother crew chief's faith. The plane had flown like a champ for better than four hours in night carrier operations, and neither the pilot nor the copilot could complain about end results as we prepared for the follow-on launch. I joked with the crew chief about how I'd probably have nightmares about the avionics in Seven's rotorhead, but admitted openly that the plane had been all he had said she would be. Prior to launch, he visually verified that the promising wink of the flight ready light was justified, and at 1120 (right on time) we launched.

The approach to the ship was smooth (I commented to my not-too-modest aviator self). We had been waiting in the delta pattern for a deck spot, second in our section. When the spots cleared, both of our planes landed directly on the spot with no extraneous delay. Such had not been the case a couple of times in the earlier launch. My copilot and I had had to wave off as our wingman had not quite settled on the deck as we were on short final. There's nothing particularly unusual about that, but it can be irritating if your approach to that point had been good. This time, however, everything was fine. We landed behind our wingman, made our simulated pickup and were off of the deck without incident.

From there we proceeded overhead for our sojourn in the delta pattern. The delay for our flight was necessary for staging, but nothing is quite as miserable as doing circles in the sky for an hour, going round and round in a right-hand orbit until one gluteus isn't as maximus as the other. We had already been in that sorry state for 25 minutes when we received a call from center extending the invitation of an LPD* for us to shoot some approaches to her deck. Apparently, her deck crew needed some practice with our breed of cat, and it had become obvious that at the moment, we had nothing better to do. So the skipper cut the last two aircraft of his flight of four free, and we were on our way.

As we descended from 1,000 feet Delta, a number of things were running through my mind. First of all, I welcomed the opportunity to escape Delta (that almost goes without saying). I was happy, too, to be going to an LPD because there I would finally have an opportunity to let my copilot shoot a few landings. This operation was the first time he had been exposed to shipboard landings, and although I wanted to give him as much exposure as possible, night operations from the left seat of an H-53 did not seem to me to be the most prudent introduction to carrier approaches. A day-lit LPD, however, was just what the doctor ordered, and I intended to let the copilot take every advantage of it. It was time for his patience to be rewarded.

Our section flew an unusually deep downwind for a port to starboard approach, partially in an effort to lose altitude from 1,000 to 300 feet and partially to ensure the side numbers on the vessel were the one's we sought. As we turned to final, our altitude was still 500 feet, and I told the copilot to keep her going down. As we approached the prescribed altitude of 300 feet, I told him to hold it there for a while, as I judged our distance to be well beyond the glide slope we would want to intercept. He leveled us out at around 275 feet, lined up nicely for an approach to spot 2. Our airspeed was good, at about 50 knots.

Continuing the approach, it appeared to me that our wingman was slowing down a little early in front of us. It appeared to me that we were going to have to take it around again. No sooner had the thought formulated in my mind than the copilot was declaring, "I'm going to wave it off," over the radio. Sensing no particular alarm, I mentally congratulated him for the call and told him that I had the aircraft. Being in the right seat, I was going to do a simple 360 and set him up for another approach. As I took the controls and started my turn, he said it:

"I can't get enough left cyclic!"

For the first time, the alarm was there, and my own matched it. The right roll I had initiated for my turn continued on its own, independent of my inputs. As we rolled to 90 degrees angle-of-bank, and maybe beyond, efforts to bring the stick back to the left were useless; my hand, my shoulder, my leg and the cyclic were all locked to the right side of my seat. As we rolled through 270 degrees of

*amphibious transport dock ship

I reached for the emergency release handle on my window. As I pulled it, I looked up to see maybe four inches of light between the top of my window and the light brown waterline. Water was rushing in from what had been my lower windshield and the chin bubble as I pushed the pilot's window out.

turn, and maybe more, I saw the water coming up to meet us. The cyclic betrayed me again as I tried to bring the nose up to avoid the ocean. No pitch and no roll, with the sea closing. All I had left was the collective, and with our nose heading for the deck, I pulled all that we had . . . maybe to bring the whole front end up to avoid the impact . . . maybe to level it up enough to be survivable. As the crew chief was screaming "What's wrong?," and I was answering in expletives, the plane impacted.

From my perspective, we impacted five to 10 degrees nose down, 60 to 90 degrees angle-of-bank. The motion had barely slowed when I began screaming, "Get out! Get out!" Without thinking . . . totally without thinking . . . I reached for the emergency release handle on my window. As I pulled it, I looked up to see maybe four inches of light between the top of my window and the light brown waterline. Water was rushing in from what had been my lower windshield and the chin bubble as I pushed the pilot's window out. Before I could release my shoulder harness, the plane continued its roll to the right.

Initial exit from the helicopter was mercifully free of entanglements, disorientation and all of the other horrors we sometimes depict in our mind's eye. But because of what I perceived to be the right roll of the craft, I egressed down and out away from the plane. After what seemed to be a long time, I broke the surface.

I came up gasping, disoriented and swallowing saltwater and JP-5. I had only been above the surface for maybe two seconds when I realized I was being pulled back in. The suction of the water filling into the aircraft cabin was pulling me back in! In one horrifying moment, I found myself back in the helicopter, beneath the surface, shut off from the air and the light. And I was scared!

This was the first time that I had really had a moment to be frightened, and the surroundings were perfect for it. I was just struggling, taking in more JP and not having the slightest notion of which way was up or out. After several long moments, I found an opening with a light behind it and went for it. Following a time that seemed far longer than the first, I broke the surface again.

My first sight out of the water was the first mechanic, and in the chaos of the moment, I was somehow *amused*. There he sat, 6 feet 3 inches of drenched humanity, perched atop part of the helicopter like a fisherman whose rowboat had simply overturned. The crew chief was scrambling up the side of the remnants of my right wheel well. The lightness of the moment passed as soon as it appeared as I splashed to get away from the wreckage, terrified that I would be pulled under again. I pulled the right side of my LPA; it inflated as advertised, and I left it there, the upper left and lower right of my life vest buoying me up, apparently content with it, and not even attempting the other toggles. Then I began screaming for my copilot.

It didn't make sense to me. From where I sat, my side of the aircraft was the one that impacted heaviest; the roll was in my direction; where the hell was he? An H-46 was already overhead with the harness in the water right in front of me, but I had to find him. I don't think I intentionally ignored the harness, but I was still swimming around, yelling for a copilot who wasn't answering. When the harness passed in front of me the second time, I reached out and pulled it in. I took the harness under my arms and hooked it to the fastener above me. As they pulled me out of the water, on the way up the hoist I watched as a light blue civilian yacht pulled alongside the wreckage of my helicopter. As I was pulled in by the H-46 crew chief, I saw two of my three crewmen being helped aboard the vessel. I never saw my friend again.

There was no reason for him to have remained in that helicopter. Mine was the side that had impacted. If anyone overhead had wanted to guess whose was the helmet bobbing among the wreckage, the safe bet would have been mine. But only three of four crewmembers escaped from Seven's last ride. More than 24 hours would pass before we would begin to learn why.

The copilot's side had remained intact, with only the chin bubble broken out. Even the notorious H-53 pilot's seat had, for once, held true. His window was still closed; the emergency release handle still shear wired in place, untouched. When the divers found him, he was near the ramp area, with two blade ropes loosely wrapped about one arm and one leg. The flight surgeon's examination would reveal no signs of injury, no marks, no possible indication of unconsciousness as a result of the impact. The findings were clear and painfully simple: Death by saltwater drowning.

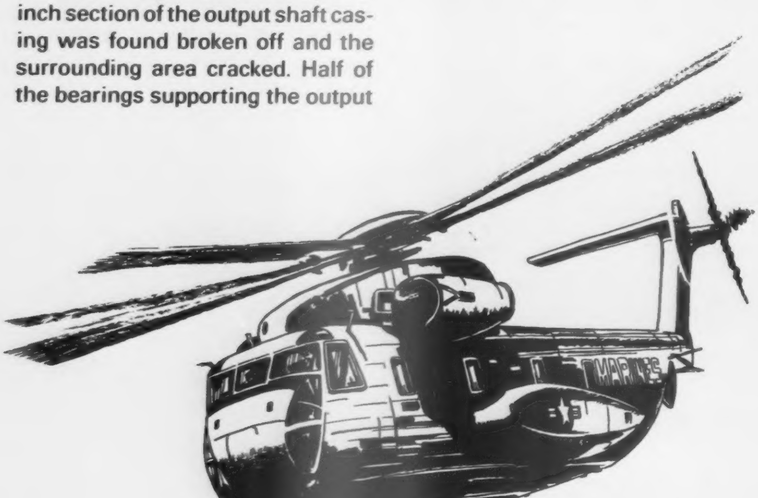
I'm not sure what new lessons can be gleaned from these events. I am personally grateful for a number of things: the landing checklist that saw my harness locked for a routine approach, the harness that held, the training that made egress a matter of instinct instead of contemplation and the rapid response of a truly professional H-46 crew. But perhaps most of all, I am thankful for the final judgment call of a copilot whose approach "just didn't feel right" . . . a call that may have saved the lives of three fellow crewmen, his wingmates and a flight deck crew.

See Stallion Save. On the last leg of a cross-country flight, a barely perceptable vibration was noted in the rudder pedals of a CH-53D. At the time, the helicopter was at 3,500 feet MSL (2,000 feet AGL), 130 KIAS and had been airborne for two hours and 15 minutes. The flight continued and control of the aircraft was transferred to HAC from the H2P. Several minutes later an unusual whine was heard followed by a master caution light and chip detected caution light. The HAC immediately reduced power to 30 percent torque and began setting up for a precautionary landing at a civilian airfield less than five miles away. During the descent, the H2P completed the landing checklist while the crewchief pulled and reset the chip detected circuit breaker. On short final, the vibrations became increasingly severe. An uneventful landing was accomplished followed by an emergency shutdown.

Upon postflight inspection of the intermediate gearbox, a six square-inch section of the output shaft casing was found broken off and the surrounding area cracked. Half of the bearings supporting the output flange had disintegrated. The remaining bearings were distorted and fused together.

Due to the high RPM of the driveshafts in this area (3011 input/2298 output), a total failure was surely imminent, probably followed by a loss of aircraft control.

The crew's quick decisive action almost certainly averted a tragic mishap.



Safety Standdown Lessons Learned. In a recent Pacific Fleet aviation safety standdown, areas specifically addressed included complacency, stress and stress coping and other psychological factors — more subtle areas of safety awareness — common to most naval aviation communities. Lessons learned in these areas were categorized as follows:

1. There are no new causes for mishaps — just repeats of past cause factors. Continual reinforcement of the need to avoid past mistakes will help prevent future ones.

2. Complacency is a major factor in mishaps and near-mishaps. Human error results, not from willful non-compliance with NATOPS and SOP, but complacency regarding routine, repetitive tasks.

3. Stress is a factor that is difficult to quantify, and equally difficult with which to deal as it relates to aviation safety. Stress is brought on by personal/family problems, administrative workload (which increases as the aviator gains seniority) and perceived pressures to "get the job done" above all else.

4. Primary considerations of doing the job safely and preserving assets must be continually re-emphasized. Sometimes this policy is not adequately conveyed to junior personnel who, understandably, are often over-zealous in their pursuit of high operational standards.

Several AIRPAC units made recommendations, which are as follows:

1. The safety program could be augmented by development of newer safety material, use of computers and reinstituting large safety posters. The Naval Safety Center is, in fact, moving in this direction. COMNAVAIRPAC has recently tied into the Naval Safety Center's computer and has immediate access to a large amount of safety and mishap data. It is expected that this capability will be expanded and enhanced in the future.

2. More effectively use medical support personnel to identify high stress profile aviator. Some training should be provided to help recognize and cope with stress problems.

3. Re-emphasize importance of explaining operational goals to all levels of the chain of command on a

regular basis, stressing need to make safety the primary consideration. Operational goals will never be met if there aren't enough assets to meet the commitments.

Warning Goes Unheeded. The TA-4J uses a single tone generator for both canopy unlock and radar altimeter low altitude warning systems. The only audible difference between the two warning tones is the pulse repetition rate. Some pilots have difficulty distinguishing which is which. This one did.

To add to the confusion, his aircraft had a previous discrepancy on the radar altimeter system. Its warning tone cycled on and off intermittently below 5,000 feet. Even though it had been corrected, the pilot thought this was the warning he was hearing some moments after he turned off the radar altimeter before his takeoff roll. The warning stopped several seconds into the takeoff roll, and the pilot said he "felt relieved."

His "relief" was shortlived, though. As the aircraft accelerated past 250 knots, the canopy took off on its own. The pilot brought the plane back in good shape. The canopy was retrieved from a roadside a mile or so from the departure end of the runway.

His canopy locking sequence had not been completed before takeoff. The rifle bolt was not placed in the locked position which, in turn, failed to engage the locking lugs. Also, he didn't see the illuminated canopy light or confirm the locking lugs were engaged during his takeoff checklist — "canopy down — lock-light auto." Maybe he would have heeded the warning tone for what it was trying to tell him if it was separate and distinct from the radar altimeter low altitude warning (a recommendation).

Buckeye Save. During a routine FAM hop in the T-2C Buckeye, the instructor pilot, Capt. David Mullins, set his aircraft up for a nose high, slow, unusual attitude maneuver. His student, 2nd Lt. Phillip Stein, performed the proper procedures, after taking control of the aircraft at 16,000 feet. Observing the airspeed slowing to 80 knots, Stein reduced power on both engines to idle and neutralized the controls. The aircraft recovered at approximately 90 degrees nose down. Upon reaching 150 knots, Mullins instructed his student to initiate his 4G/15-unit recovery.

However, Mullins could not see a response from his student, and the T-2C continued its descent. Mullins attempted recovery, but with heavy stick forces and a hydraulic boost light illuminated, he had no success. He called for Stein to get on the stick with him to add another effort on the controls. They finally recovered at 3,800 feet MSL and 380 knots.

Mullins and Stein then flew the Buckeye back to NAS Kingsville, executing a high and wide recovery. A maintenance inspection revealed a dirty air regulator which affected the bleed air entering the hydraulic reservoir, allowing the hydraulic pumps to cavitate.

Why Are We Still Out of Control? An instructor pilot on a syllabus out-of-control flight executed a rudder triplet departure. When control of the T-2C passed to the student, the aircraft progressed through vigorous post stall gyrations and into an incipient spin as expected. The student applied recovery controls in accordance with established procedures. However, rather than recovering, the aircraft began a series of uncommanded rolls. The T-2 was in a high-speed spiral with a steep nose down attitude, rapidly increasing airspeed and an increasing rate of roll. Recovery from this high-speed spiral should have been simple: Neutralize controls and apply a small amount of opposite rudder. The instructor allowed the student time to attempt a recovery. But, approaching 15,000 feet and still out of control, the instructor took control of the aircraft. Immediately increasing the student's rudder input, the instructor was surprised that even *his* recovery inputs had no effect on the situation.

All the procedures were being executed perfectly! Why was this aircraft still out-of-control, passing 11,000 feet? Were the ailerons or rudder out of alignment? Had a flap come loose? Were the idling engines radically different in thrust output? The reason was not important at that "moment of truth." All that mattered was that the NATOPS and flight training instruction procedures were not working! The instructor had only his knowledge of aerodynamics to go on.

With only 4,000 feet to go until the required ejection altitude, the IP opted to push the stick forward. This was an attempt to reduce the difference in lift over the wings. It worked. The aircraft stopped rolling. The IP immediately started a 3-G pull at 300 knots, bottoming out at 7,000 feet.

During the dive recovery, a structural tapping noise was heard by both the instructor and the student. This unknown sound, combined with the extraordinary events that preceeded, prompted an early termination of the flight and return to base under emergency status. An uneventful landing followed. A post-flight inspection revealed that a simple worn rudder hinge bushing had caused the problem.

"Seat Belts and Harness . . . Set Spectacles . . . On"

By Lt. Jerry M. Lineger, MC(FS)
VRC-50

"You have an excellent memory . . . X-P-N-O-D-M-C-P was on last year's chart."

TAKE a closer look at the aviator's perpetual nemesis: decreased visual acuity. If any one test can raise the ol' blood pressure at annual flight physical time, it's a trip to the eye lane.

To be sure, the fear is ingrained. From the first day we aspired to wear the coveted wings of gold, we were warned by our mentors to *never* drop below 20/20 vision, quit reading altogether, and memorize all the eye charts. Answer "no" to all the questions on the health history form except, of course, the positively-worded trick question — "Do you have vision in both eyes?". Always be second in line when being visually tested, listening to the first guy's answers.

Being an elite "20/20-man" myself until my first-class year at the boat school, I suddenly dropped into the "Sorry, don't call us, we'll call you" category. Although I kicked and screamed like the rest of the twenty/twenty-fivers, today I'm totally convinced that the student naval aviator vision policy makes good sense.

To be sure, the reasoning behind the policy is understandable when using an analogy between a radar system and the environment while the aircraft is manuevering under various conditions. But a radar that is "wearing spectacles," so to speak, would have the following additional characteristics:

a. A decrease in power of about five percent. Spectacles decrease light transmission by about that much.

b. Distortions in the last 35 degrees of azimuth laterally. Spectacles are optically imperfect except through the optical centers of the lenses.

c. Some extra reflective echoes. Glasses induce reflections from the front and back surfaces of lens under many conditions.

d. Occasional decreased power output by 50 percent to 80 percent under some conditions of changing atmospheric conditions from "fogging." Spectacles fog up under conditions such as going from a cool, low humidity environment to a hot, high humidity situation.

e. Some decrement in performance due to interference with equipment surrounding the radar antenna under certain manuevering conditions. A sweating jet jock peering out of his helmet and over his mask has enough problems visually without adding "blinders."

No one would buy a "two-million dollar radar" with spectacles when they could get the same system without. Hence, the strict requirements concerning visual acuity in student naval aviators does indeed seem logical, well-founded and justified.

But what about the fully trained, seasoned aviator with the newly "added item" on his approach checklist? The

"system" is undoubtedly weakened (i.e., decreased acuity) but not yet out of standards (i.e., correctable) and with his combined vast experience and *proper use of prescribed aids* (i.e; spectacles), he can successfully overcome the discrepancy and continue to fly safely. Let's examine why maintaining as perfect a visual acuity as possible is so vital to the aviator.

Sight is, without a doubt, the key sensory organ employed by the aviator. Quality control of this essential item is achieved by measurement of system accuracy using a fraction-based recording system. Normal acuity is *defined* as 20/20 — the subject sees at 20 feet what a *defined, 'normal' eye* sees at 20 feet. Lesser vision, 20/30 for example, denotes that what a 'normal eye' can accurately read at 30 feet, subject eyes need to move to 20 feet to see. Conversely, "better than normal vision," say 20/15, implies that at 20 feet you can read what the defined normal eye cannot read until being at a distance of 15 feet. Indeed, a rather simple recording system.

Now that we understand what those numbers mean, let's explore a real life situation which exemplifies the need for good visual acuity in the air — two aircraft crossing, each traveling at 600 mph, and headed on a direct collision course. The pilot with 20/10 vision has double the time to avoid collision (increasing from a scant 4.5 seconds to nine seconds) than the 20/20 pilot, and is therefore in a better position to avoid a collision even if momentarily preoccupied 'inside' the cockpit, scanning other airspace or somewhat slowed in reaction time.

Almost all aspects of aviation demand good visual acuity. A misread NAV chart (poor near vision) could subsequently result in a low fuel light and an unplanned swim. Inability to read kneeboard mind joggers in red light might necessitate turning on the white interior cockpit light with the subsequent temporary loss of night vision. Carrier ops demand an even greater degree of acuity — landings attempted with poor visual acuity can result in missed approaches or worse, fatal ramp strikes. Under adverse conditions — nighttime ops, fogged canopy or poor weather — the advantage of 20/20 vision is further intensified. Increased visual demands explain why stricter visual standards are required of aviators operating around the boat. A "radar with strong spectacles," or worse yet, a "poorly adjusted radar with *no* spectacles" in this situation, is downright dangerous.

Hopefully, by now it is clear that putting glasses on only for the landing phase is *not acceptable,* nor is ignoring warning signs of poor visual acuity: blurriness, the inability to read street signs while driving at night, or using a magnifying glass to read fine print. Since we don't fly without charts, without functioning radars, without wings on the airplane (OK helo pilots — I hear you . . .), why fly with decreased acuity?

Finally, some common misconceptions must be dispelled:

(1) Wearing of corrective lens *does not* cause the visual defects to progress at a more rapid rate (i.e., eyes don't "get worse quicker" because of wearing spectacles).

(2) Glasses other than the standard naval aviator type are *not* approved while flying, are not of superior quality, and can, in fact, be dangerous. Two examples should prove the point:

(a) Polarized lens. When used in conjunction with canopies and windscreens that may also have a polarizing effect, these can result in numerous blindspots. And you can't avoid or shoot down what you can't see . . . .

(b) Photosensitive glasses. The degree of change to the darker color is not sufficient to filter out enough of the light rays to fully protect the cornea from glare effects.

Authorized spectacles, on the other hand, are nonpolorized, of good optical quality, and constructed of comfortable *lightweight* plastic lens (a definite consideration when pulling Gs). The sunglass version filters out a full 87 percent of "glaring" light rays.

To be sure, the phrase "Spectacles . . .on" belongs on the *prestart,* not approach, checklist. Don't let vanity or the initial unaccustomed feel of spectacles make you an unsafe, mediocre aviator.

Visual Tips

(1) Wear only standard aviator glasses when flying. If required, always carry at least two pair.

(2) Don't ignore recent blurry vision or the inability to read signs at night — check it out.

(3) Protect your eyes. Always keep your helmet visor in the down position.

(4) Protect against glare — wear authorized sunglasses. Unprotected eyes exposed for three hours on a bright beach lose full dark adaptation capability for several days following the exposure.

(5) After age 42, it is unusual not to need reading glasses.

(6) Don't be talked into any eye surgery to correct decreased acuity. Orthokerototomy leaves permanent scars, results in a changing refractive error and equates to permanent grounding.

(7) Add "spectacles . . . on" to your pre-start checklist.

Minimum Approach Scan

By Lt. James Bracy
VT-28

WHEN was the last time you shot an approach to minimums, saw the runway and almost blew it by going above or below the glide slope because of lack of vertical guidance? Although most approaches provide lateral (roll) guidance, few provide adequate vertical guidance. Even though visual approach slope indicators (VASI) may be available, they may not be visible with approach minimum visibility. Therefore, it is important for the pilot to realize what he and his crew must do when the approach lighting becomes visible on an approach down to minimums.

Recent data from the National Transportation Safety Board (NTSB) indicates that almost every accident in low visibility conditions occurred after the flight crew had either seen the ground, the airport or the runway environment and was attempting to transition from instrument to visual flight procedures. For the most part, crewmembers involved in these accidents elected to continue the approach visually based on cues which did not adequately portray their vertical position relative to the runway. In most cases, a short landing resulted. Of course, this will never happen to me! But why everyone else?

One reason may be that approach design minimum visibility is predicted on the distance at which the approach lights come into view. Approach lights provide fairly good lateral or roll guidance but little vertical position guidance. This could possibly lead us into the trap of continuing the approach without sufficient visual cues.

Another problem brought out recently by the Air Line Pilots Association All Weather Committee is that the sudden appearance of runway lights can produce the visual illusion that the aircraft is too high or that the nose has pitched up. Combining the situation of being able to see only the approach lighting system and the illusion that you are too high could very well lead to a short landing.

Crewmembers must constantly be aware that they should not only have lateral visual reference with the runway environment to continue the approach beyond MDA or DH, but also they should have sufficient references for vertical guidance. If a crew is uncertain of their exact vertical position, a missed approach is the only safe alternative. Even when the crew is sure of their vertical position, only continued reference to the vertical velocity indicator and/or glide slope indicator and/or continuous attention to the final controller on a precision approach will provide the crew with a complete vertical position representation.

Data in the NTSB study disclosed that the pilots involved in this type of mishap were apparently unable to correctly assess the flight path or descent angle of their aircraft during the visual segment of low visibility approaches. The NTSB concluded that only continued and proper integration of flight instruments into the pilot's scan can detect or prevent undesired extremes in their flight plan during the instrument approach.

Certain human limitations often result in the commission of two fundamental errors during a normal, low visibility approach. First, when the runway environment comes into view, the instrument cross-check scan is abandoned and, consequently, orientation with the proper glide slope is lost. Secondly, sudden total reliance is placed on highly compromised visual landing cues, cues which may not only misrepresent the actual aircraft descent gradient, but may tend to appear and disappear at a moment's notice. It is especially important for instructor pilots who require their students to rely solely on the gauges until reaching the missed approach point, and then suddenly look up and become reliant upon only visual cues for the remainder of the approach, to re-evaluate their technique to include a broader scan from the student prior to going visual.

The point is, landing in limited visibility presents many psychological obstacles, such as apprehension and uncertainty, as well as the physical complexity of the approach itself. Procedures, as well as skills, must be developed in monitoring the instruments beyond the point at which you go visual. In a crew concept aircraft, effective utilization of the copilot is perhaps one answer. However, in single-seat jet aircraft, the pilot must continue to scan his flight instruments himself to assure proper descent gradient.

To successfully integrate a visual scan for the runway into an instrument cross-check, the pilot must periodically look out, even when visibility restricts him from seeing anything. This allows the pilot to begin picking up landing cues as soon as they appear. Also, an established periodic outside scan eases the transition from instruments to visual. A normal instrument approach scan should include a frequent runway scan, as if it were one of the flight instruments. Once the runway is in sight, the flight instruments should be scanned as though they were a part of the runway visual scan.

Occasionally, we find ourselves attempting to land in conditions we hadn't counted on. Careful thought and preplanning of the approach procedure is most important; however, don't forget to plan and think ahead for that moment when the runway lights come into view. A quick scan of the VVI, glide slope indicator, airspeed indicator, altimeter or attitude gyro may just save you from taking the "ride of your life."

The Ten Commandments of the Landing Signal Officer [LSO]

By Lcdr. M.R. Groothousen
CVW-8

I. THINE EYES BELONG IN THE GROOVE

This may be the most difficult law to impress on the new LSO. A multitude of aircraft have been saved long before the ball call. The controlling LSO doesn't have to look at the book or book writer to make his comments, and looking up the deck should be a backup LSO task. Secondly, the 180-90 or CGA portion of the pass undoubtedly affects the pilot's start and may be the true cause of difficulty vice technique once on the ball.

II. THOU SHALT NOT ACCEPT GARBAGE

It has been said that the three greatest killers of naval aviators have been "Pride, Fear and Hurrying." I see this relating to the pilot-LSO team as such: The pilot can salvage any pass whereas the LSO can successfully wave anyone. The pilot fears the penalty box and his LSO the pressure (real or perceived) to get him aboard. In their haste, the pilot makes the large play in close while his LSO allows waveoff window creep.

III. THOU SHALT CONSIDER SAFETY ABOVE ALL ELSE

The underlying reason for all we do as LSOs. If you cannot stand the heat from above or below, and you compromise this most important task, you do not belong on the platform.

IV. THY HANDSET SHALL COMFORT THEE

The controlling LSO must never lose situational awareness. Far too many times aircraft emergencies or pilot difficulties are passed by means other than UHF. Those supporting the platform have to be extra eyes and ears. During CQ or flex deck, change controlling LSOs often in order to avoid fatigue. Platform speakers are not that reliable to take a chance at missing valuable information. Keep the handset to your ear!

V. THOU SHALT NOT REDIRECT YOUR ATTENTION

The backup LSO's corollary to number I above. Assign another team member to talk on the phone or MC. You are an all-too-important check valve to have your total concentration interrupted.

VI. THOU SHALT NOT PREDICT A CLEAR DECK

We are not in this business to play the odds in a detrimental fashion. Either there are men, equipment or aircraft in the landing area and we move the waveoff window aft or we wave the aircraft to a normal waveoff point. Back row kibitzers, put away your crystal balls please.

VII. HONOR THY PLATFORM AND EQUIPMENT

All too often LSO equipment problems and malfunctions have found their way into mishap reports, and usually we have only ourselves to blame for its status. Gripe your equipment religiously and follow up on it. Some air wings even use MAFs for this purpose. A word to the phone taker or call to primary just does not hack it. See that a complete MRC deck exists or produce one locally.

VIII. THOU SHALT USE THY TRAINING AIDS

The pickle switch is the best pilot training aid you have at your disposal. Consistent errors or flagrant disregard can strike home more rapidly this way. Motivational strokes, positive or negative, during debriefs are a must. Analyze the pilot, and treat accordingly.

IX. THOU SHALT NOT COVET IGNORANCE

LSOing starts in the readyroom where you not only train your pilots but also ensure an understanding of our hierarchy on the platform:

1. Safety
2. Expeditious recovery
3. Hands-on LSO training
4. Grading

X. THY DILIGENCE IS THY TASK ABOVE ALL OTHERS

As any active participant in aviation, you must always check six and keep your guard up. Being an LSO, not unlike a pilot, is fun, demanding and a rewarding job but you can never lose sight of the fact that lurking out there is someone trying to kill himself, you or both!!

Helicopter Wake TURBULENCE

By The Bureau of Air Safety Investigation
Commonwealth of Australia

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MOST pilots are aware that the wingtip vortices generated by large fixed-wing aircraft can present a hazard to other aircraft which encounter them, particularly during takeoff and landing. The force of this wake turbulence can be gauged by the fact that some years ago overseas a DC-9 — a large aircraft itself — crashed while making an approach to land behind a DC-10, killing all on board. The investigation concluded that the probable cause of this accident was an encounter with the trailing vortex of the DC-10, resulting in an involuntary loss of control.

For those who have become a little hazy on wake turbulence, the key points to remember, in general terms, are as follows:

- Wake turbulence is usually worse behind a large, slow aircraft which is in a dirty configuration.
- The turbulence descends at about 500 feet per minute to about 900 feet below and behind the generating aircraft.
- It is most persistent over an airfield where there is a five knot crosswind.
- The greatest loss of control will occur when an aircraft climbs on the same heading through the wake of the generating aircraft.
- While wake turbulence is most dangerous to aircraft which are taking off or landing, aircraft encountering it at cruise altitudes may still experience loss of control, airframe overstress and, in the case of jets, engine compressor stall.

It is also important to remember that the life span and size of vortices are significantly affected by ambient conditions. As a guide, experiments have shown that vortices close to the ground will typically last from one to approximately two minutes, while at higher altitudes the vortex life may be as long as five minutes. Depending on the generating aircraft's speed, vortex trails may vary in length from less than two nm to up to five nm.

Helicopters

The hazards presented by the downwash of a stationary helicopter are generally well known. Some pilots, however, seem to be unaware of the fact that moving helicopters can also generate severe wake turbulence similar to the wingtip vortices of fixed-wing aircraft.

There have been several instances of helicopter wake turbulence as a factor in accidents. The following report illustrates this:

A light twin-engine aircraft was making an approach to

land behind a reasonably large 10,340-pound helicopter. The helicopter had completed its approach and was air taxiing to the left of the active runway. When the light aircraft was on short final approach over the threshold and about 300 meters behind the helicopter, its starboard wing dropped suddenly; before the pilot could take full corrective action, the aircraft impacted the runway heavily, nose first. Damage was substantial. Wind velocity at the time was 30 degrees off runway heading from the left at five knots.

From an assessment of the evidence, the possibility exists that the light twin may have encountered wake turbulence generated by the helicopter.

Pilots must appreciate that the wake turbulence from a heavy helicopter can be significantly more severe than that from a fixed-wing aircraft of the same weight. As a rough guide, a 19,800-pound helicopter on approach at 40 knots generates about the same vorticity as a 59,400-pound fixed-wing aircraft on approach at 120 knots.

Pilots should observe the same avoidance techniques for helicopter turbulence as they do for that produced by fixed-wing types:

- land beyond the helicopter's touchdown point.
- take off before the helicopter's takeoff point.
- remember that the vortices will drift downward and behind the helicopter at all times when it is airborne.

The main point to remember is that a large helicopter can be a formidable vortex generator and should be given a wide berth.

I Can Hack It!

By Cdr. George Crim
VA-146

"I CAN HACK IT" Have you ever said that to yourself? *Sure you have!* We all have. It's almost a requirement in many facets of Navy life. That concept, when applied to aircraft discrepancies and pilot/aircrew limitations, has probably cost the Navy more lives and machines than any other attitude. Every one of us can probably relate a story of an aircraft mishap caused by the pilot/crew accepting an aircraft with a problem, or pushing on into weather that ultimately was below their minimums, or above their capabilities. How about this one . . . .

An A-7E pilot was on his second squadron tour. He was an experienced (1500+ A-7 hours) attack pilot on his department head tour. One night a squadron was part of an air wing field carrier landing practice (FCLP) schedule at NAS WestPac in preparation for the next at-sea period commencing in two days. The weather was clear and 80° F with no moon, but some light from ships and the port facilities. Due to the winds, the southwest runway was being used. It requires a right-hand pattern with the fresnel lens set up at midfield for FCLP passes only. Final landings use the whole runway.

The pass down from the previous pilot was "Good bird, but occasional the HUD FAIL lights." The heads up display and presentation was fine, but for some reason it was triggering the HUD FAIL and MASTER CAUTION lights. A-7 HUD jokes aside, the pilot had been taught that you don't fly with caution lights, but it was only FCLP; it wasn't a downing discrepancy and, besides, he knew he could hack it.

Prelaunch checks taxi and takeoff for the direct entry were normal. As he turned downwind for the first time, the master caution light came on — sure enough — HUD FAIL. The HUD was working fine, so he punched the master caution light out and continued. Ten seconds later the HUD FAIL light went out.

Turning off the 180 in the right hand pattern at this field is a little uncomfortable. All the lights are below you in the bay. You know the terrain to the northeast rises quickly to 1,800 feet or so within two to three miles. That's one of the reasons the lens is halfway down the runway, to keep the pattern tight and inside base housing and the hills. There are no lights from the 135 till you roll out on final.

Coming through the 135, the MASTER CAUTION light came on again — same problem. This continued intermittently throughout the six FCLP passes. Each time the light came on, he confirmed it was the HUD FAIL. Finally Paddles called him to full stop next pass. No sweat, landing checks complete, off the 180, deeper this time to use the whole runway. No lens for the approach — working hard! Rolling wings level, the MASTER CAUTION light came on again. Busy, he punched it off and continued the approach to a nice touchdown at the approach end. Good aerodynamic braking, nose fell through at about 100 KIAS, gently on the brakes, 5,000 feet to go, no sweat. Deceleration was normal to 60 KIAS, just past the midfield gear, when both pedals went to the floor! The pilot was momentarily confused, pushed harder on the bottomed-out brakes — no good — 3,000 feet/60 KIAS! He checked anti-skid off and tried the emergency brakes which were also no good — too late to go around! Five hundred feet before the long field gear he dropped the hook — and trapped — thank God! Sitting there in the arresting gear he looked down at the caution panel and finally noticed that *HYD PRESS* was lit instead of *HUD FAIL.* If he had skipped that last wire, or if the hydraulic failure had occurred beyond it, he had a choice of riding the A-7E down a 50-foot drop and into the water, or ejecting.

Can you imagine explaining all this to a group of your peers and seniors seated around a long green table? How do you explain losing a machine because you were too busy to recognize a simple hydraulic failure? Sure you were set up, but who set up who? This failure, incidentally, was caused by the port brake B nut backing off and draining the PC-2 system, slowly at first, but rapidly once the brakes were applied.

The bottom line on safety is professionalism, and a pro knows his limitations and those of his aircraft, **cold!** He's too smart to put himself in a position that he can't handle. He always stacks the deck in his favor. He knows when to down the aircraft or wait for the weather to clear. After all, that's how he survived long enough to become a pro!

Attack Aircraft Class A F/FRM

Rates vs. Pilot Experience CY 77-83

By M.S. Borowsky, Ph.D.
Naval Safety Center

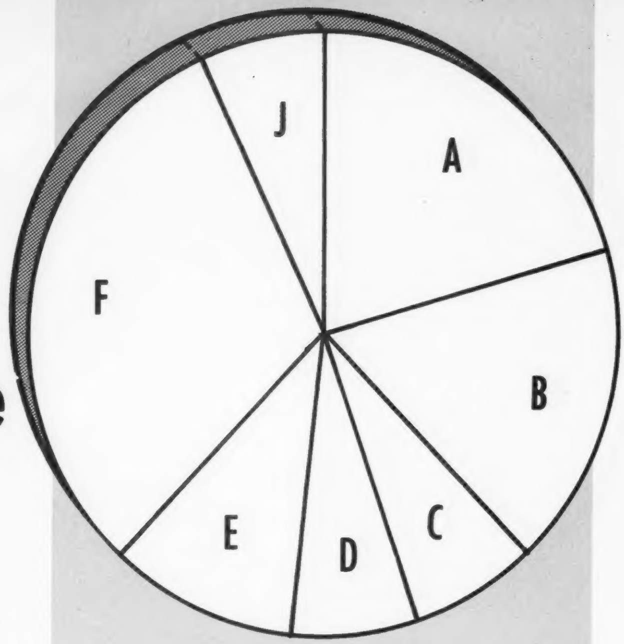
Graphics by Frank L. Smith

The charts on this and the following three pages show Class A F/FR pilot factor mishap rates as functions of lifetime hours in model and total hours. The rate for a specific experience level is the number of pilots/copilots in control and at fault at that level per 100,000 flight hours accrued by *all* pilots at that experience level — not merely those in mishaps. Specific problem areas with the numbers of occurrences are provided for the specific experience levels.

Major categories of problem areas are shown only if they are represented by at least three mishaps. Therefore, the pie charts do not have a uniform number of "slices."

The pilot factor mishap rate in attack aircraft significantly (α = .0006) decreased as time in model increased. The rate was particularly high for pilots with less than 300 hours in model. *Total hours, in themselves, were not significantly (α = .09) associated with pilot factor mishap rate.* However, interactions between these factors showed very high mishap rates. Also, pilots with at least 500 hours in model had lower mishap rates than pilots with less hours in model, regardless of total hours; the difference, however, being less severe as total hours increased.

Follow-on articles will break down the rates for fighter, prop and helo aircraft.



Lifetime Hours in Model: 0-300
Total Hours: 451-750
17 Pilots/Copilots
Rate: 10.73

A. Violations of regulations/NATOPS — 6 (20.69%)
- Violation of general air discipline — 3
- Continued VFR under unfavorable weather — 2
- Overconfidence in maneuver — 1

B. Physical/mental condition of pilot — 5 (17.24%)
- Vertigo — 1
- Disorientation — 1
- Distraction — 2
- Other — 1

C. Improper use of flight controls in air — 2 (6.90%)
- Poor landing technique — 1
- General misuse — 1

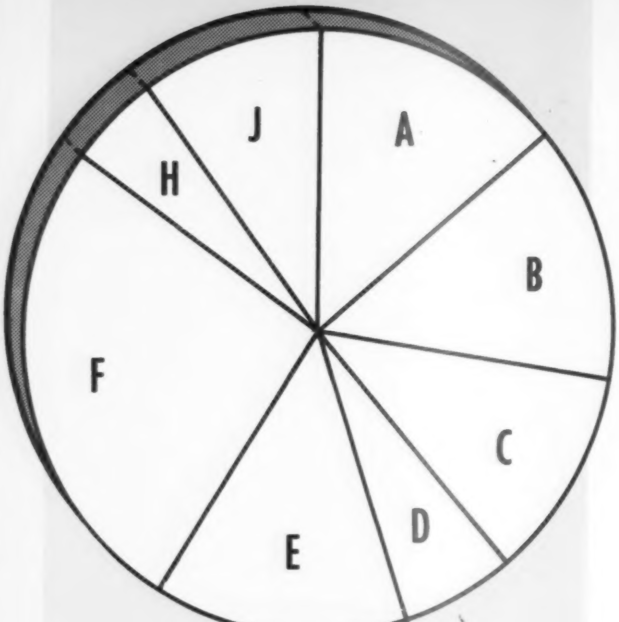
D. Improper response/technique for CV/FCLP landings — 2 (6.90%)
- Waveoff — 2
- Improper scan or correction for "meatball" — 1
- Attempt to salvage poor approach — 1
- Slow response to LSO — 1

E. Failure to maintain flying speed — 3 (10.34%)
- Insufficient airspeed for gross weight — 1
- Improper recovery technique from unusual attitude or stall — 1
- Failure to recognize approach to stall — 1

F. Judgment errors — 9 (31.03%)
- Failure to recognize dangerous situation — 6
- Inadequate evaluatio of circumstances — 2
- Altitude on target run — 2
- Low in landing approach — 1
- Poor landing technique — 1
- Distance too close between aircraft in "in flight operations" — 1

J. Exceeded ability and/or experience — 2 (6.90%)
- In type aircraft — 1
- In mission or maneuver — 1
- Insufficient refresher experience — 1

Note: Mishaps generally involve multiple factors. The sum of factors (A — L) may, therefore, exceed the total number of pilots/copilots. Likewise, the sum of the subfactors under a particular factor may exceed the specific factor total. The percentages are based on the sum of the factors (A — L), not the number of pilots/copilots.



Lifetime Hours in Model: 0-300
45 Pilots/Copilots
Rate: 6.36

A. Violations of regulations/NATOPS — 11 (13.75%)
  Violation of general air discipline — 5
  Continued VFR under unfavorable weather — 2
  Failure to follow instructions — 1
  Violations of SOP — 2
  Overconfidence in maneuver — 1

B. Physical/mental condition of pilot — 11 (13.75%)
  Fatigue — 1
  Vertigo — 1
  Fixation — 2
  Disorientation — 3
  Distraction — 3
  Other — 2

C. Improper use of flight controls in air — 9 (11.25%)
  Overcontrol — 2
  Poor takeoff technique — 4
  General misuse — 1
  Poor landing technique — 1
  Improper post-stall gyration recovery technique — 1

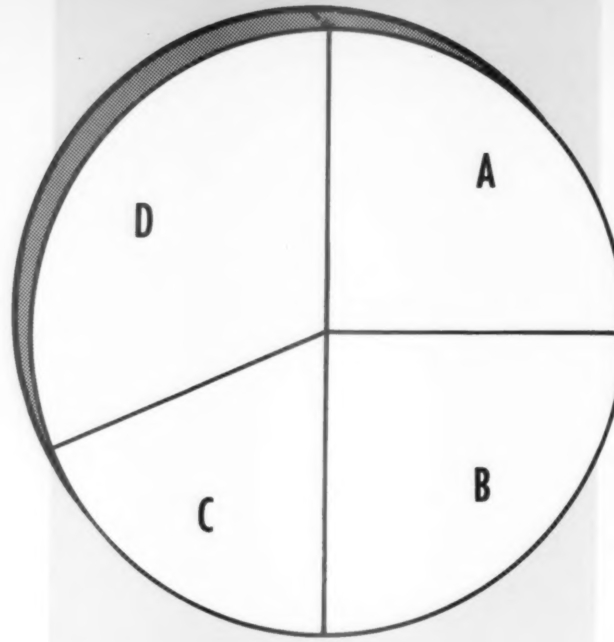
D. Improper response/technique for CV/FCLP landings — 5 (6.25%)
  Waveoff — 2
  Improper scan or correction for "meatball" — 2
  Excessive sink rate — 2
  Attempt to salvage poor approach — 1
  Glideslope control — 2
  Power management — 1
  Slow response to LSO — 1

E. Failure to maintain flying speed — 11 (13.75%)
  Insufficient airspeed for gross weight — 1
  Insufficient airspeed for maneuver — 2
  Improper recovery technique from unusual attitude or stall — 2
  Failure to recognize approach to stall — 7

F. Judgment errors — 21 (26.25%)
  Failure to recognize dangerous situation — 10
  Inadequate evaluation of circumstances — 2
  Distance between aircraft in formation — 1
  Altitude on target run — 3
  Low in landing approach — 1
  Poor landing technique — 2
  Landing zone clearance — 1
  Miscellaneous — 5

H. Poor aircrew coordination — 4 (5%)

J. Exceeded ability and/or experience — 8 (10%)
  In type aircraft — 2
  In mission or maneuver — 3
  Insufficient refresher experience — 2
  Pilot beyond limits of experience due to emergency — 1
  Pilot beyond ability level due to emergency — 1



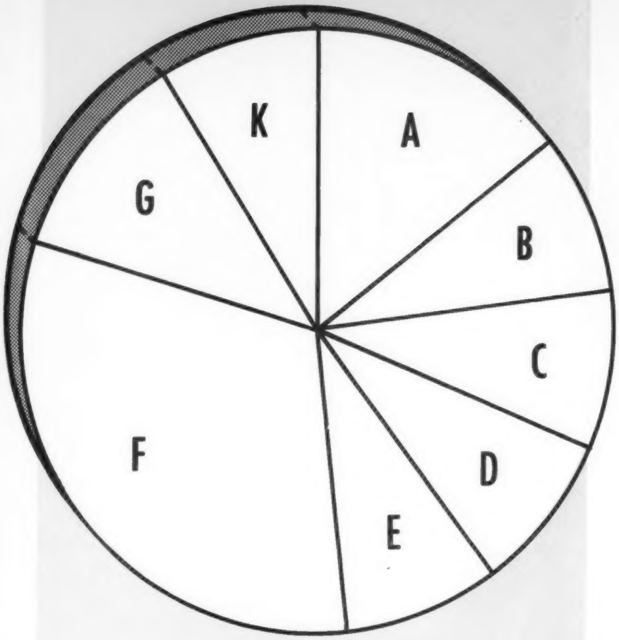
Lifetime Hours in Model: 301-500
16 Pilots/Copilots
Rate: 3.91

A. Violation of regulations/NATOPS — 4 (25%)
  Violation of general air discipline — 2
  Violation of SOP — 1
  Inadvertent violation of NATOPS — 1

B. Physical/mental condition of pilot — 4 (25%)
  Fatigue — 1
  Fixation — 1
  Disorientation — 1
  Distraction — 1

C. Improper use of flight controls in air — 3 (18.75%)
  Excessive sink rate in landing approach — 1
  General misuse — 2

D. Improper response/technique for CV/FCLP landings — 5 (31.25%)
  Not lined up — 2
  Attitude control — 1
  Improper scan or correction for "meatball" — 2
  Excessive sink rate — 1
  Glideslope control — 3
  Power management — 2



Lifetime Hours in Model: 501-1000
24 Pilots/Copilots
Rate: 2.84

A. Violations of regulations/NATOPS — 5 (14.29%)
- Violation of general air discipline — 3
- Violation of SOP — 1
- Intentional violation of NATOPS — 1
- Inadvertent violation of NATOPS — 1

B. Physical/mental condition of pilot — 3 (8.57%)
- Serious upset condition — 1
- Fixation — 1
- Distraction — 1

C. Improper use of flight controls in air — 3 (8.57%)
- Overcontrol — 2
- Excessive sink rate in landing approach — 1
- Poor landing technique — 1
- Improper spin recovery technique — 1

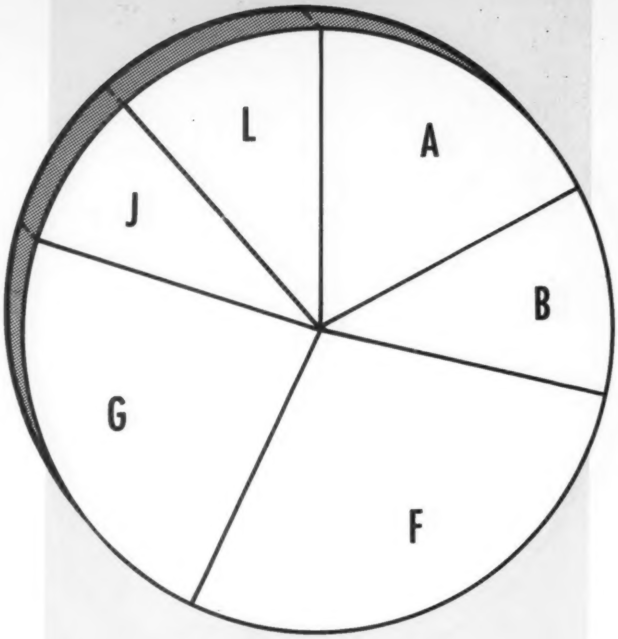
D. Improper response/technique for CV/FCLP landing — 3 (8.57%)
- Not lined up — 2
- General improper action — 2

E. Failure to maintain flying speed — 3 (8.57%)
- Improper recovery technique from unusual attitude or stall — 1
- Improper recovery technique from fully developed spin — 2
- Failure to recognize approach to stall — 1

F. Judgment errors — 11 (31.43%)
- Failure to recognize dangerous situation — 4
- Inadequate evaluation of circumstances — 1
- General judgment errors — 2
- Distance too close between aircraft in "in flight operations" — 1
- Altitude above ground/water on target run — 4

G. Inadequate flight preparation — 4 (11.43%)
- Accepted aircraft with known discrepancies — 2
- Incomplete preflight due to haste/preoccupation — 1
- Improper storage of loose gear — 1
- Inadequate briefing of crew/passengers — 1

K. Exceeded stress limits — 3 (8.57%)
- Max "G" limit as result of abrupt maneuver — 1
- Max "G" limit as result of progressive stall — 1
- Max design speed for maneuver — 1



Lifetime Hours in Model: 1000+
24 Pilots/Copilots
Rate: 2.67

A. Violations of regulations/NATOPS — 6 (17.14%)
- Violation of general air discipline — 1
- Continued VFR under unfavorable weather — 1
- Violation of SOP — 4

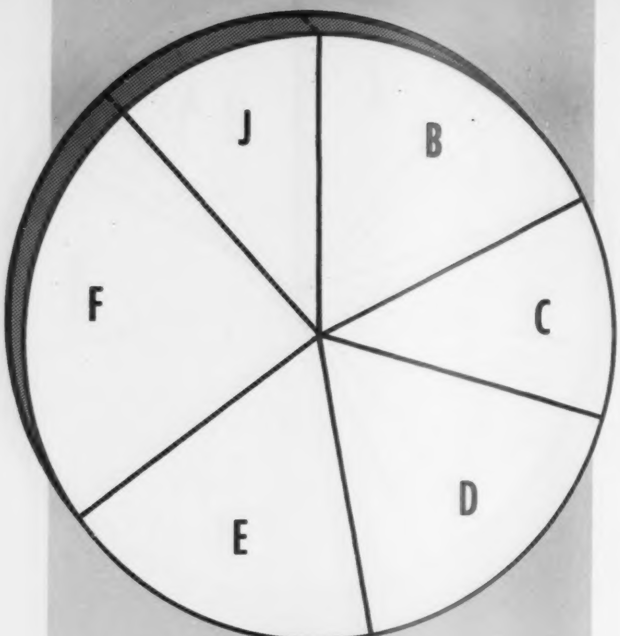
B. Physical/mental condition of pilot — 4 (11.43%)
- Fixation — 1
- Disorientation — 1
- Complacency — 1
- Distraction — 1

F. Judgment errors — 10 (28.57%)
- Failure to recognize dangerous situation — 4
- Inadequate evaluation of circumstances — 1
- General judgment errors — 3
- Distance too close between aircraft in "in flight operations" — 1
- Altitude on target run — 2
- Poor landing technique — 1

G. Inadequate flight preparation — 8 (22.86%)
- Failure/incomplete use of checkoff lists (failure to extend landing gear) — 1
- Flight controls/airframe — 3
- Poor navigation planning — 1
- Accepted aircraft with known discrepancies — 2
- General planning failure — 1

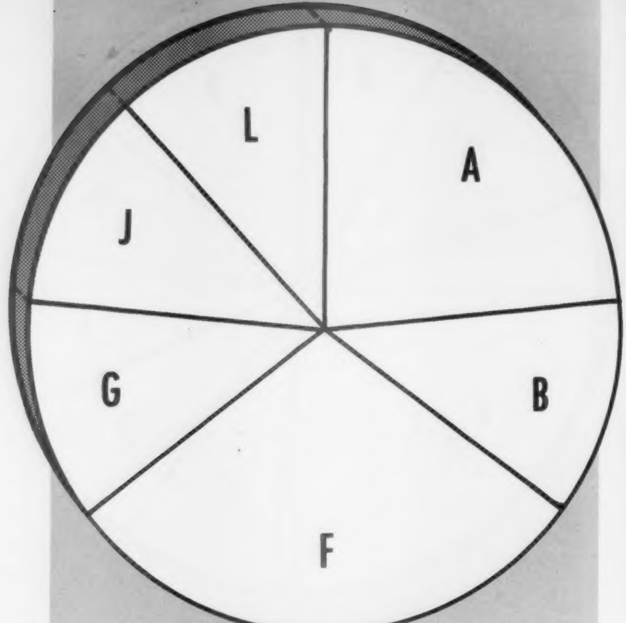
J. Exceeded ability and/or experience — 3 (8.57%)
- Insufficient refesher experience — 3

L. Inadequate lookout procedures — 4 (11.43%)
- Failure to see other aircraft in air — 3
- Failure to utilize available external lighting — 1



Lifetime Hours in Model: 0-500
Total Hours: 1001-1500
10 Pilots/Copilots
Rate: 9.00

B. Physical/mental condition of pilot — 3 (17.65%)
Fixation — 3
C. Improper use of flight controls in air — 2 (11.76%)
Poor takeoff technique — 1
Improper post stall gyration recovery technique — 1
D. Improper response/technique for CV/FCLP landing — 3 (17.65%)
Improper scan or correction for "meatball" — 2
Excessive sink rate — 1
Glideslope control — 1
Power management — 1
Not lined up — 1
Attitude control — 1
E. Failure to maintain flying speed — 3 (17.65%)
Insufficient airspeed for maneuver — 1
Failure to recognize approach to stall — 2
F. Judgment errors — 4 (23.53%)
Failure to recognize dangerous situation — 1
Altitude on target run — 1
General — 2
J. Exceeded ability and/or experience — 2 (11.76%)
Mission or maneuver — 1
Insufficient refresher experience — 1



Lifetime Hours in Model: 1000+
Total Hours: 2000+
13 Pilots/Copilots
Rate: 1.90

A. Violations of regulations/NATOPS — 4 (23.53%)
Violation of general air discipline — 1
Continued VFR under unfavorable weather — 1
Violation of SOP — 2
B. Physical/mental condition of pilot — 2 (11.765%)
Disorientation — 1
Distraction — 1
F. Judgment errors — 5 (29.41%)
Altitude on target run — 1
Poor landing technique — 1
Distance too close between aircraft in "in flight operations" — 1
General judgment errors — 3
G. Inadequate flight preparation — 2 (11.765%)
Accepted aircraft with known discrepancies — 1
General planning failure — 1
Failure/incomplete use of checkoff lists — 1
J. Exceeded ability and/or experience — 2 (11.765%)
Insufficient refresher experience — 2
L. Inadequate lookout procedures — 2 (11.765%)
Failure to see other aircraft in air — 1
Failure to utilize available external lighting — 1

Nightmares and Flight Deck Injuries

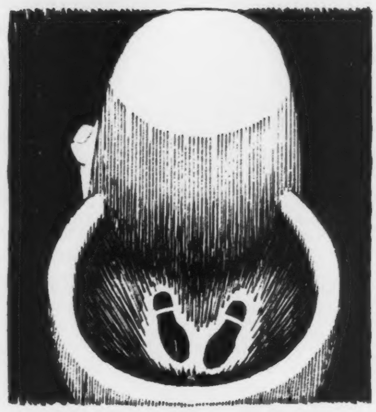
By Cdr. H.D. Connell II
VA-27

The vibrant young man I had talked with earlier at the morning FOD walkdown had just died in the intake of an A-7. My young shipmate had somehow wasted his life in a preventable flight deck accident. How do these tragedies keep happening?

A grisly record of broken bones, amputation and crushed bodies has been interwoven into flight deck safety statistics for years. Each improvement in aircraft performance seems to bring with it increased intake, exhaust or noise hazards. At the same time, tactical imperatives have pushed the fleet toward higher deck multiples, increased tempo of operations and innovative handling procedures such as battle flex deck (BFD) operations.

Much has been written about the dangers of this environment; yet the butcher's bill from serious deck injuries continues unabated. The development of high density BFD operations threatens to make our flight deck operations even more expensive in terms of human loss. Under BFD, the normal, expected and well recognized hazards of launch and recovery are magnified by the extreme flexibility of the situation. The unpredictability of BFD reduces the ability of the deck crews to anticipate hazardous situations and take appropriate precautions. It's hard to know when to duck if you can't see the punch coming.

Serving as a follow-on to the traditional general introductory programs, the personnel qualification standard (PQS) offers both a familiar format and a natural emphasis for safety training. Unlike the group ses-



sions common to indoc training, PQS also gets the individual personally involved in the learning process. The lesson guides and qualification sheets direct each man through both inquiry and education. Flight deck safety and maintenance PQS qualification should become a prerequisite to flight deck billet assignment. Certainly it should be a prerequisite to flight deck pay.

No one who loses a shipmate in a gory intake or blow down accident will soon forget it. We need to take action now that reduces the chance that our next deployment will be marred by such tragic loss and painful memory. More formal training qualification systems and recurring dramatic demonstrative programs are needed to augment our traditional indoctrination programs.

Our traditional approach to flight deck safety has centered on general education and indoctrination. Type commander requirements for squadron predeployment lectures and air department programs to introduce new men to the operating environment of the flight deck provide excellent background preparation for topside safety. Squadron and division leadership follow up with programs for maintaining a climate of safety consciousness and hazard awareness throughout the deployment. These efforts, while an excellent foundation, are effective only as a starting point. A more formal approach is required to reduce the mishap potential of present fleet operating conditions.

Two approaches, each of demonstrated effectiveness in areas outside the normal scope of flight deck training, offer high potential for upgrading our personnel safety record: periodic dramatic demonstration and formal PQS qualifications.

We are all familiar with the effective, dramatic demonstration programs used by the National Safety Council, state highway patrol and driver education programs. In the Navy, the film "Man from LOX" represents another example. Although termed shock therapy by the squeamish, the approach is well suited for emphasizing the perilous consequences of inattention while trying to survive in the world's most dangerous work place — the carrier flight deck. Shock treatment works on the highways; it can help on our flight decks as well.

PQS programs, well known in the fleet as part of technical training and advancement programs, are another way to drive home the lessons of the indoctrination programs. This approach has been implemented by VA-27 and a few other squadrons on the basis of locally generated documents. ➤

One hour out we got a chips light on No. 1. Securing the engine, we turned for home and planned for a . . .

Three-Engine Landing

By Lt. Dan Duffy
VT-28

WE had a 0730 brief for a fleet exercise involving a large number of P-3s acting as aggressors. It was a perfect day for flying and everyone was well rested and ready to go. As I walked into maintenance control, my plane commander greeted me with "The flight shouldn't last long, we're going to have a chips lite." Sure enough, this aircraft had a chips lite on No. 1 the two previous flights. Normal maintenance had been performed and the aircraft was up. *We had to take it.* We took off at 120,000 pounds and proceeded to on-station; one hour out and as predicted, we got a chips lite on No. 1. We secured the engine in accordance with NATOPS, turned for home and started planning our return. In the back, our TACCO* completed his flight summary, including the phrase, "Flight aborted for No. 1 chips lite, returned to home field and executed *an uneventful three-engine landing.*"

Up front, the plane commander casually remarked that

*TACtical COordinator

this would be his *first actual* three-engine landing. Neither of us was the least bit concerned, since every P-3 pilot has executed dozens of simulated one and two engine-out landings in the course of training. The only difference was that, when training, after touchdown the pilot would bring the three operating engines into reverse and stop the aircraft while maintaining centerline. The purpose was to familiarize the pilot with the asymmetric reverse characteristics of the P-3.

Upon arriving at the field, we noted that a shower had passed through and left the runways wet, but with no visible standing water. Since we were heavy, we circled the field at 2,000 feet waiting to burn down to 103,880 pounds. Although within limits, this is still heavy for landing and subsequently requires a faster approach and touchdown speed. Tower offered us a runway situated into the wind, but the plane commander elected to take the longest runway at the field, a left parallel with asphalt paving between the two runways. The problem with this decision was it put the wind into the right side with two good engines, which can cause control problems when reversing. The crash crew rolled out and lined up on the left side of the runway. After burning down and reviewing our procedures one more time, the PPC commenced the approach.

He was a little fast across the threshold and 10 to 15 feet left of centerline on touchdown. Then it happened. When the nose wheel touched the deck, the PPC pulled the three good engines into reverse and we swerved right, toward centerline. I wasn't sure at this point whether the plane commander was in control or not, but at least we were drifting back toward the center of the runway. At centerline the nose cocked 30 degrees to the right, and I knew we were in trouble.

I went to put in full left rudder but found the plane commander had already done so. He put the number 3 and 4 power levers to flight idle but it was not enough to correct what had now become an extremely uncomfortable situation. As we approached the right side of the runway, I hit full left brake as a last attempt to stay on the runway. It proved futile as we departed semi-sideways 2,000 feet down the runway at 110 knots just missing the arresting gear housing. Later analysis showed tire skid marks for 1,200 feet.

We came to a more or less thundering halt amidst a cloud of swirling dust and surrounded by fire trucks. The firemen gestured furiously at the left and right brakes, and I was thinking, "Great, they're on fire." Question: When both sides are on fire, on which side to you exit the aircraft?" Luckily, it was only hot brakes. Apparently the ride in back was smooth as the TACCO called on ICS and said, "Hey, are you clowns going to release the crew or what?" I invited him up front for a look. His comment upon reaching the front was, "Whoops." I called the tower to say we were OK and asked for a tow to the hangar. A later playback of tower internal conversation revealed a couple of whoas, a scream, a sigh of relief and then, "Gee, I'm sure glad I offered them the other runways."

The plane commander wanted to taxi back to the hangar (a bad idea), and I called tower again to see if the center taxiway was stressed for a P-3. After checking, they said no, but we taxied *anyway*. Now, we did a pretty good soft shoe for the powers that be anyway, but had we fallen through the center asphalt while taxiing, our hides would still be drying on the side of the hangar for all to see.

Damage to the aircraft? Pretty minimal actually; new tires, etc. Ego? Strike damage. Lucky? Hard to believe, but yes, extremely. Why? Think back. Had we landed on the right parallel we would have departed onto soft ground and possibly torn the gear off. The fire trucks were on the left side and out of danger only by chance since they approached from that side of the field. Had they been on the right, we would have plowed right into them. Who puts out the fire when the fire trucks are on fire? And lastly, we didn't break through the center apron. Lessons? A few very good ones:

1. If you have 8,000 feet of runway and touch down in the first third, you'll roll to a stop in ground idle before you reach the end. If you don't need maximum reverse, don't use it!

2. Appreciate the effects of wind on asymmetrical reversing. Use, within practical limits, the best runway available to compensate for wind.

3. Be aware of hydroplaning. A wet runway can hurt you.

4. Always land on centerline, not much else to say about this.

5. If you're landing engine out, you know which way you'll swerve if you lose control due to excessive reverse/hydroplaning; tell the crash crew to station themselves on the safer side of the runway.

6. At what point should a cockpit "subordinate," i.e., the copilot, take control of an aircraft for safety reasons? The answer seems obvious enough. But a majority of comments I have heard when relating this tale and asking the same question was something like this, "If you do elect to take control of an aircraft over your plane commander, you better save it or they are going to hammer your *XXXX!*" Think about this question yourself, and be ready for this situation if and when it arrives. Reflecting on this incident, I feel as though I should have done something more positive in trying to avoid this situation. Even as a copilot, I had a responsibility to the aircraft, crew and myself.

I've since been designated a plane commander and have made some three-engine landings in the rain. All worked out fine with the help of some hard lessons learned. While no naval aviator wants to make mistakes, many do, and the good ones learn from their own personal experiences and those of others. I hope all can learn from this one.

Cockpit coordination has been a contributing factor in over 50 percent of the P-3 mishaps/incidents. How do you feel about your personal "Cockpit Resource Management?" Do you feel highly trained in technical areas, but very little in interpersonal relationships? Send your comments to: Naval Safety Center, Naval Air Station, Norfolk, Va. 23511 — ATTN: Code 112. — Ed.

Lcdr. Bob Scherer (left),
Lcdr. Scott Hendrickson (right).

Lcdr. Scott Hendrickson
Lcdr. Bob Scherer
HSL-30

FOR Lcdr. Scott Hendrickson it had been a routine hop training new functional check pilots for the SH-2F helicopter. Early during the second cycle, he and Lcdr. Bob Scherer were maintaining a 15-foot hover over the north/south taxiway at NAS Norfolk Heliport. Having completed the hovering portion of the maintenance check, Hendrickson was reviewing the functional check-pilot's checklist in preparation for departure from the heliport when the aircraft commenced a yaw to the right. Hendrickson visually noted that full left rudder had been applied, and yet the helicopter continued in its right yaw rapidly increasing in the rate of turn. After approximately 270 degrees of turn, Hendrickson alerted his copilot and secured both engines. The aircraft settled, impacting the ground in a level attitude after approximately another 120 degrees of rotation; the helicopter continued to ground spin for another 140 degrees. Scherer was able to maintain essentially a level attitude throughout the entire rotation and cushioned the landing. It is estimated that the aircraft drifted less than five feet from the initial point of hover and completed almost *two revolutions in three to five seconds.* The mishap investigation determined that the tail rotor drive shaft had been severed due to chaffing by an oil line, resulting in a complete loss of tail rotor thrust.

Maj. Tom Bull, USMC
Capt. Marshall Smith, USMC

THE flight had been a routine breaklocks/ACM* exercise in the warning areas north of NAS Key West. While effecting a rendezvous with his playmate (an ANG F-106), Maj. Tom Bull, USMC, deployed the fuselage speed brakes on his EA-6A Electric Intruder (EA-6As do not have wingtip speed brakes). After join-up, the pilot selected the closed position on the speed brake select switch and received a barber-pole indication on the integrated position indicator. The wingman verified that the speed brakes were indeed fully deployed. Bull and his ECMO** Capt. Marshall Smith, USMC, noticed the port combined and starboard flight hydraulic

*Air Combat Maneuvering
**Electronic Countermeasures Officer

BRAVO ZULU

system pressures falling. Complying with the NATOPS emergency procedure for speed brake failure, the crew lowered the landing gear. The fail-safe feature of the speed brake system did not work and the boards remained open.

Level flight in an EA-6A cannot be maintained with the gear down and the speed brakes out. Since the aircraft was now at 5,000 feet AGL and 50 nm from Key West, the crew decided to retract the landing gear and declare an emergency. The crew had 5,000 pounds of fuel remaining but observed a fuel flow of 9,000 pounds per hour per engine (about 100 pounds per mile).

Bull lined the aircraft up for a straight-in approach to Runway 03 at NAS Key West and transitioned to the landing configuration at 3 nm and 1,500 feet AGL. Initial sink rate with the gear down was observed at 2,000 feet per minute! After executing a flare over the runway threshold to bleed off airspeed, Bull guided the crippled aircraft to a successful arrested landing at 115 KIAS. Subsequent investigation traced the problem to a failed speed brake selector valve, allowing the speed brakes to open but not allowing hydraulic pressure to vent in order to close the speed brakes.

Analysis of Naval Safety Center records revealed that A-6 fuselage speed brakes had never failed in the open position and not closed when emergency procedures were applied. Bull and Smith did an outstanding job when faced with a situation that has never occurred before and thus was not adequately covered in NATOPS procedures.

Capt. Marshall Smith, USMC (left), Maj. Tom Bull, USMC (right).

Pre-mishap training:

One Squadron's Approach

By Major L.L. Larson, USMC and Major J.A. Schara, USMC
HMM-161

AN aircraft mishap is a painful experience that places physical and emotional strains on everyone in a squadron. A mishap board must be established to sift through a mountain of records, statements and reports to answer the ultimate question — why?

It is also a time to say goodbye to comrades and attempt to console their bereaved families. The commanding officer experiences a sense of failure for losing lives and valuable resources. It is a very bad time indeed, but a time when realistic pre-mishap training proves invaluable.

In HMM-161, we decided to organize and conduct a pre-mishap drill to provide our junior officer watch standers with a realistic simulation designed to prepare them (and hence the unit) for a real situation. We wanted our materials to be complete enough to provide for an adequate hands-on simulation, but we also wanted these materials to be flexible enough for modification and frequent reuse. Having selected these broad parameters, we turned our focus to detailing specific objectives.

The primary objectives of a squadron pre-mishap drill are to involve as many of our duty standers as possible. Since squadron duty officers (SDOs) and operations duty officers (ODOs) are normally the first to receive mishap notification, they are the primary recipients of our training. We decided that an excellent way to accomplish this would be to organize teams. They revolve around the functional areas required to establish an accident board. As a result, the billets of commanding officer, aviation safety officer, aviation maintenance officer and admin officer were agreed upon in addition to the SDO and ODO.

Our next objective was to provide training requiring a "hands-on" approach. While all our prior training involving the pre-mishap plan had been conducted on a regular basis, it had usually been restricted to lectures. Our opinion was

that the information would be retained far longer if team members actually had to sort information and produce some type of "end product." Since a mishap is such a complex event, we determined that several end products would be required from each team. The first would be a flash report from the SDO/ODO. This would require these team members to sort through some provided materials and receive telephone information to execute a rapid notification to higher headquarters. A second end product was established as the "four-hour" message to the Safety Center. This requirement necessitated some coordination with other team members in order to provide the maximum amount of information. Finally, we decided to include a casualty notification message since this is another time-sensitive requirement in any aviation mishap. A clear benefit of this approach became the review of the squadron mishap order by many team members in order to produce the required reports.

Once our objectives were established, the next step became the preparation of the materials required for each team to use during the drill. This rapidly became a major project since we wanted to be as realistic as possible. We started with the SDO and ODO. After establishing a scenario involving two aircraft on a routine troop lift having a midair crash, we started assembling materials. Since ample copies of many of the needed orders were not available, pertinent sections were copied and placed into billet folders. The necessary sections of the squadron pre-mishap order, the telephone notification of a mishap form, the flash report form and a squadron recall roster were placed in the SDO's folder. The ODO's folder contained an exercise flight schedule, a copy of the FRAG sheet (describing the mission to be flown by the mishap aircraft) and weight and balance forms for each mishap aircraft.

In similar fashion, folders were prepared for each of the other team members. Although many of the duties became impossible to simulate, we decided to make team members ask for materials that would normally be on file for the duties we could simulate. For example, the maintenance representative needed to ask for the aircraft discrepancy records containing the yellow sheets. The NATOPS officer required NATOPS jackets and log books. These were constructed especially for the exercise. To generate thought and team work, requests had to be specific; for example, during the drill, one team member asked for the NATOPS jackets. The response he received was, "Which ones do you want? I have over 60 of them on file." He then had to return to his team to find the mishap aircraft bureau numbers and

then go to the maintenance team member to get the yellow sheets containing the names of the crewmembers for each aircraft. Finally, he approached the exercised controller and asked for the jackets by name, at which time the proper jackets were given to him.

The admin team member was required to exert the most effort. Since we were determined to include a casualty assistance drill as a portion of the mishap exercise, service record books and officer qualification records had to be accurately produced. A major benefit of expending this effort was to emphasize to supervisors the importance of accurate record of emergency data information. These final materials were produced in sufficient quantities for the number of teams involved. By this time, the stack of materials to be used for one team was over a foot tall!

With the necessary materials completed, we were now ready to determine how the exercise would be conducted. A "brainstorming" session was used to accomplish this phase of the planning. In keeping with our hands-on approach to training, we decided that each team would receive information from its respective controller via a field telephone. The exercise would start with notification of a crash being received on the 'phone and all notifications to higher commands or update situation information would be made using the same phone. Each controller had a prepared script and gave additional information only when requested. Other team members were allowed to participate only when notified by the SDO/ODO via the telephone.

As an additional learning tool, we agreed to stop the exercise at several points and have one team brief its current progress. We felt that this method would stir team cooperation and permit group discussion. The intervals decided upon were after the flash report was transmitted to the next higher headquarters and an additional break after all controller's had issued all their exercise materials to the teams. A final debrief was then designed to include the "four-hour" message and the "casualty notification" message.

Having completed the preparation phase, it became a simple matter to run the mishap drill. To ensure a smooth flow, the day before the drill, all of the controllers conducted a pre-exercise. This allowed us to identify fine details such as providing sufficient pens and paper for each team. The actual play of the problem ran well because of these efforts. One artificiality we designed into the exercise was that of instant information. This allowed us to keep everyone busy and, therefore, interested. It also made it possible to condense the maximum amount of training into a two-hour frame!

In the final debrief, it was apparent that our objectives had not only been met but had been far surpassed. Each participant had gained valuable experience in dealing with a difficult situation. The officers had achieved meaningful training in how to deal with a real eventuality. Although the preparation had been extensive and time-consuming, the system produced was one that could be used over and over again. The drill could also be modified to challenge personnel as they gained proficiency or to emphasize different learning objectives. We walked away confident that our duty standers could react accurately and expeditiously to any real mishap situation.

HMM-161 has done a fine job in setting up a pre-mishap training program as outlined in this article. It could serve as a model for similar programs in both Navy and Marine Corps squadrons of any aircraft type. Well done!
— Como. J.C. Breast, Commander, Naval Safety Center

Cold Weather Word Scramble

Using the words in the two right hand columns, circle the appropriate letters to spell each term. Words may be spelled forward, backward, diagonally or up and down. When you are finished, use the remaining letters to find the hidden *Message*.

T	T	I	R	E	S	T	W	T
S	E	I	G	O	F	N	R	O
U	E	R	A	L	F	A	I	W
A	L	N	T	E	T	L	R	I
H	S	U	L	S	N	O	W	N
X	W	I	P	E	R	O	D	G
E	R	M	D	L	O	C	I	V
I	U	B	A	T	T	E	R	Y
J	S	N	I	A	H	C	N	G
W	I	N	D	C	H	I	L	L

BATTERY	OIL
CHAINS	SLEET
COLD	SLUSH
COOLANT	SNOW
EXHAUST	TIRES
FLARE	TOWING
FOG	WINDCHILL
ICE	WIPER
JUMPSTART	

Courtesy: AT1 Steven J. Ludwig and AMSI Thomas J. Eaton

Preflight:

By Peter Mersky
Approach Staff

"WHAT do you mean we've got to ditch?!" The cry came from the back seat passenger in the Aeronca two-seater, 1,000 feet above the Hudson River. The pilot had just told the older man behind him that they had apparently run out of gas. Since they were in the middle of the river, they could not safely glide to a landing site ashore. The frightened passenger could not swim a stroke. The thought of ditching did not sit too well, and he let the pilot know it. He threatened to strangle the younger, smaller man in front of him immediately if he did not find some dry land. The pilot quickly looked for another place to land and discovered . . . the *George Washington Bridge*!! Right off to the left!

Without further ado, the pilot put the Aeronca down on the huge bridge. Everything was fine until a large trailer truck, coming from the opposite direction, side-swiped the little wood-and-fabric aircraft, smashing it against the side of the bridge. Fortunately, the two men in the plane received only minor injuries.

Investigators found that the probable cause of the loss of fuel was an improper preflight. The pilot had failed to check the gas cap above the wing or had left it improperly secured. The gas had streamed from the tank during flight. The engine had indeed stopped from fuel starvation. Simple as that. (This is a true story. This writer knows the pilot.)

Tsk, tsk, you say. An amusing story, but one with little relationship to a professional military aviator, or aircrewman, especially in the U.S. Navy. Not so.

A Hawkeye plane captain was told to prepare his aircraft for a nighttime defueling, which included opening the gas caps atop the wings. After waiting two hours, the plane captain was relieved by another man who was shortly afterward told to secure the aircraft altogether. The petty officer quickly locked the airplane and departed the flight line; after all, it was nearly midnight.

The next morning, the E-2 was manned, started and taxied toward the catapult. Fortunately, the assistant maintenance control officer noticed the fuel cap flapping on the starboard wing. The pilot immediately shut down while the plane captain secured the cap. This sequence of inattention could have caused some real problems and the probable loss

: One More Time

You may be missing critical items on half of your preflights.

of an aircraft and crew if the maintenance officer had not been sharp. The first plane captain didn't tell his relief, and the relief didn't check the plane before leaving for the night. And, to make matters more interesting, the plane captain and copilot did not check topside security during the morning preflight.

Then there was the Corsair pilot who left the NAS with a hasty preflight, only to have his oil light come on after 20 minutes of flight. Fortunately, he was pointed toward an airfield, declared an emergency and made an uneventful precautionary landing. The postflight disclosed that the oil filler cap was off, and the engine had lost eight quarts of oil. The aviator recalled only glancing at the cap. It turns out that the line crew had serviced the oil system without telling the pilot. Although the pilot had no reason to suspect the cap had been handled, he should have checked it for security.

An A-4E was scheduled for a postmaintenance check flight. Since it had not flown for nine months, a thorough preflight would have seemed to be in order. The takeoff was normal, but within 200-300 feet altitude, witnesses heard a loud report and saw the aircraft enveloped in flames. The rear section departed, leaving the forward section to fall to the ground. The pilot did not eject.

There were two main contributory factors to this mishap. First, the plane captains apparently failed to properly secure the fuselage fuel cap, a mandatory point of inspection for the Skyhawk series. Second, the pilot failed to check the cap for security during his preflight. The cap came off in flight, allowing fuel to siphon down the fuselage side and catch fire.

Everyone knows you're supposed to conduct a thorough preflight, carefully checking key points around the aircraft before strapping in. But there are occasions when your attention span, or lack of time, short circuits even the best of intentions and your preflight suffers. At that point, your safety is in jeopardy, along with the safety of your crew, your passengers and anyone living under your flight path.

Of course, it is impossible to put numerical values on the chances of a flight going wrong from an improper preflight, just like it is with any hazard connected with aviation. You'll have to admit, however, that your chances for a problem arising during some part of the flight are increased by not properly inspecting your aircraft.

Working with the Sandia Corporation of Albuquerque, N.M., Dr. Alan D. Swain compiled an interesting set of statistics dealing with human reliability. He applied his findings toward working with complex weapons systems and commercial activities.* He took the list of tasks that are a part of operating a nuclear power plant and connected it with the possibility of making an error which he calls HEP, Human Error Probability. Many of the list's tasks can be directly associated with preflighting a complex, heavily automated, military aircraft. Keep in mind that these percentages are *only* estimates. Obviously, you can't categorically state that after your 100 preflights, the 101st will bring trouble. You might go until the 152nd or the 300th until you have a problem.

For instance, during walkaround inspections, using a checklist correctly, there is an HEP of .01 of not recognizing an incorrect area. Using a checklist incorrectly, the HEP rises to .1 — .5. In other words, without a checklist or improperly using one, you run the risk of an error from one out of 10 times to five out of 10.

Once you're in the airplane, consider an HEP of .001 for improperly reading a digital display. One out of 1,000 — not too bad, you say. Well, remember that you probably read that display — maybe an altimeter — 300 times during a normal hop (two times a minute), maybe more during a high-pressure instrument flight or weapons sortie. If you fly two or three times a week, representing 900 or more scans of that display, within that week, you've probably gone past the 1,000 mark. Certainly within a month's time, you'll probably have misread that display more than once. Misreading an altimeter on a low-level bombing hop or during an actual IFR approach, could be fatal.

Theoretically, *you may be missing critical items on half of your preflights* if you don't do them "by the book." ◄

*Handbook of Human Reliability Analysis With Emphasis on Nuclear Power Plant Applications, NUREG/CR-1278, October 1980.

Night VERTREPS

Airlifts In the Dark Are a Challenge

By Bud Baer
Approach Staff

RUNNING a helicopter delivery/pickup service for a task force doesn't sound terribly exciting, does it? Because there are so many ups and downs involved in VERTREP (vertical replenishment), I learned the hard way that it demands expert piloting — particularly at night. Also, it occasionally offers a thrilling moment (one we can better live without — if we want to live at all).

We were VERTREPing it one day in our H-46 between the carrier and various supply ships. We worked about three hours during the midday period, took a two-hour break and resumed in the afternoon. We had more than seven hours of flight time accrued when we landed on the CV to refuel.

"Would you like to secure now?" the air boss asked.

"Any of you want to call it a day?" I asked the crew.

No one indicated they wanted to stop. No one said they were tired. We had 40 lifts remaining on the schedule, and I'm sure the crew wanted to complete the day's work, and I did, too.

Flying would be a little more "challenging" now. The horizon was not readily evident. We no longer had the benefit of additional "pinky time"; dusk, that is. In other words, it was pitch dark.

We performed an instrument takeoff, climbed to 175 feet, leveled off and turned toward our objective ship. As HAC (helicopter aircraft commander), I was at the controls in the left seat. I switched my scan outside the cockpit to determine the position of the ship for which we were aiming. While I was looking outside, my copilot saw the radar altimeter warning light come on. It was preset at 75 feet. It read 50 feet with a rapid rate of descent! My copilot instantly reached for collective as the altitude was decreasing through 25 feet and was pulling collective pitch at a mere 10 feet.

"Hey, the main landing gear is in the water," one of our aircrewman said rather excitedly.

The copilot stayed on the instruments and flew our chopper hurriedly to a safe 500-foot altitude.

"Wow, that was a close one," I told the copilot. "You certainly did a good job getting us up and away from a possible dunking. We were lucky on this one."

We flew right back to the CV and shut down. There was no damage — just wet wheels. Standing around the helo, thankfully, we talked about what had just happened.

"Obviously, we didn't maintain the proper altitude during our approach which almost led to our inadvertent water entry," I noted rather lightly. "In other words, we almost got dunked. I've been VERTREPing so long maybe I've become a bit complacent, overconfident. In such a low-level environment, things can go awry quickly. I see now that my sense of overconfidence in the cockpit may have made my piloting too automatic for my own good. Maybe I wasn't giving enough attention to detail. This could make you less aware of dangers and pitfalls of flying VERTREP — especially at night."

In analyzing what went wrong and how to avoid such an incident in the future, we came up with the following:

- When moving into night VERTREP, a detailed brief should precede the mission. It's essential to the safety and success of night VERTREP. The VERTREP patterns, cockpit duties and flight conditions should be discussed. The possible necessity for immediate overriding of the controls by the pilot not flying must be thoroughly agreed upon and understood.
- The pilot not on the controls must be constantly vigilant and safety-oriented. While one is flying, the other must back him up continually. (In our near mishap, my copilot prevented it. But not by a very large margin — inches at best.)
- Ship positioning is also a consideration. During daylight conditions, the transferring/receiving ship is usually located where it is readily visible and reachable. At night in the absence of a natural horizon, though, visibility can be influenced negatively by ship distance, size and lighting. Each of these factors must be taken into consideration.
- Fatigue is a real threat during VERTREP. In retrospect, we should have answered the air boss, "Good idea, let's secure for the day." All of us were hypnotized by the "can do" spirit. This nearly cost us the whole ball of wax. We already had seven hours under our belts for the day. There was no need to press on — particularly changing to the nighttime environment. Our lives and our helo are certainly more important to our CV's state of readiness than the VERTREP loads that are not delivered because of fatigue. There's always tomorrow.

What Caused That Mishap?

By Lcdr. Thomas L. Partin and
Lt. Micheline Y. Eyraud, MSC
Naval Safety Center

ANYTIME a Class "A" mishap occurs, all of us involved in safety would like to know the answer to this question. Mishap board investigators try to determine the causal factors related to a particular mishap. The results of these investigations are used by Safety Center analysts and others to help identify problems and keep them from recurring. However, the unique naval aviation environment often stands in the way. When there is no aircraft wreckage to examine or survivors to interview, the mishap board has no alternative but to assign a cause factor of "undetermined." During 1982 and 1983, 63 of the 175 Navy/Marine Corps Class "A" mishaps resulted in submerged wreckage. Causal factors were undetermined in 31.7 percent of the water wreckage mishaps, while causal factors were undetermined in only 15.2 percent of those mishaps which occurred on land.

One way to reduce the number of undetermined mishaps might be to put flight data recorders in all our aircraft. This is not a new idea — these devices have been around for a number of years. Flight data recorders are standard equipment on commercial aircraft, and the information obtained from these recorders are routinely used by agencies such as the National Transportation Safety Board in their investigation of aircraft accidents.

The purpose of a flight data recorder is to monitor and record vital aircraft systems status. These include engine parameters, flight profile information, flight control systems status and warning/caution/advisory signals. Following a mishap, this information can be examined by the mishap board in its investigation to determine what led up to the mishap.

Some naval aircraft, such as C-9Bs, C-2s, P-3Bs and KC-130Rs are presently equipped with flight data recorders. Their worth has been demonstrated in mishaps where this data has played a role in helping to determine causal factors. However, a number of problems exist with the present recorders which preclude their use on the majority of naval aircraft. Perhaps the most serious problem is their size — they are approximately the size of a standard briefcase and, therefore, are too large for most tactical aircraft. Other serious drawbacks are that they are capable of recording only a small number of aircraft parameters, they require extensive maintenance and often have considerable down time.

However, there is an alternative to the present flight data recorder. The Air Force is currently considering a solid state crash survivable flight data recorder for tactical aircraft. A prototype has been developed and flight testing will begin in mid-1985. Design specifications were drawn up with the cooperation of the Navy and Army in order to make it a tri-service standard flight data recorder. Capabilities of this recorder allow for over 70 aircraft parameters to be recorded and stored on a single memory chip for up to 74 minutes of flight.

There are a number of advantages to this state-of-the-art flight data recorder. Its most important feature is that the recorder is much more compact — the crash survivable memory unit is contained in a small cube approximately 31.5 cubic inches (roughly the size of a coffee cup) and weighs less than four pounds. Incorporation of a component such as this is more feasible for tactical aircraft where real estate is so precious and where each added ounce of weight detracts from overall aircraft performance. The solid state flight data recorder is also more reliable and requires virtually no maintenance.

Adoption of a solid state flight data recorder would be a quantum leap for all of us concerned with safety. Maintenance troubleshooting is another area which would benefit from the use of flight data recorders. However, its most immediate payoff is that it would provide the data necessary to remove the doubt surrounding mishaps where there is no real evidence to work with. The faster and more accurately we can answer the original question, "What caused that mishap?" the easier it will be to save lives and aircraft in the future.

Pre-Mishap Kit Safety Tip.

An aircraft mishap drill conducted by FAIRECONRON TWO (VQ-2) in Rota, Spain, brought to light a major problem in conducting investigations, particularly during the hours of darkness. Team members experienced difficulty in seeing and recognizing each other at the "crash" site. At the scene of a mishap, visibility and positive identification of authorized personnel are very important and can greatly reduce the state of confusion that exists during the early phase of an investigation.

To alleviate the problem, I suggest that a reflective vest similar to the type worn by bicycle riders be used. We bought a bike rider vest on open purchase at the local Navy Exchange for $7.00, a small investment to solve a big problem.

Lcdr. Walt Gromada
VQ-2

Re: Takeoff/Landing Hazard on Intersecting Runways Aug '84

As an air traffic control school instructor, I shudder at what the consequences of this incident could have been. I am not defending the tower controller in question; however, I believe he was anticipating separation based on FAA 7110.65 para 1112, "Takeoff clearance need not be withheld until prescribed separation exists if there is a reasonable assurance it will exist when the aircraft starts takeoff roll" and OPNAV 3710.7 para 515b, "When cleared for takeoff, aircraft shall take off without undo delay or clear the duty runway."

Without having access to all the pertinent information and the tapes of this incident, I have numerous questions:

1. With the developing situation, why was the aircraft not "cleared for immediate takeoff or continue holding"?
2. Why was a multipiloted aircraft on departure frequency? Was he told to "change to departure" or did the pilot do this on his own?
3. Did this tower have override capability on departure frequency?
   a. If so, was this used to cancel takeoff clearance; if not, why?
4. Did the departure controller attempt contact with the aircraft; if not, why?
5. Was Guard (both 121.5 and 143.0) used; if not, why?
   a. If used, did the pilot hear it?
   b. If the pilot did not hear, why not? Was he monitoring Guard?
6. Was the PAR P-3 already "cleared to land" or was he told to continue?
   a. If told to continue, why was a mandatory "tower clearance not received," waveoff not given?
   b. If landing clearance was given, why was this not canceled? He who giveth can taketh away.

The Navy may be able to amend the wording of FAA 7110.65 para 994-USAF as follows: "When an aircraft is cleared for takeoff, inform it of the closest traffic within six miles on final approach to the same (or intersecting) runway. If the approaching aircraft is on a different frequency, inform it of the departing aircraft."

In summation, this incident appears to have been totally avoidable. Pilots: When cleared for takeoff, do it. You do not have an inalienable right to that piece of concrete. Monitor Guard (both 121.5 and 243.0 if you have both). Controllers: KNOW your precedures, facility equipment, capabilities and OPTIONS available; most of all USE them; they will keep everyone safe and happy.

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Flight Deck FOD

FPO San Francisco — "Sometimes you can't see the forest for the trees." "We're chasing ants while being stomped by elephants."

We've all heard these phrases before and have correctly interpreted them to mean "keep perspective on whatever you're doing." Today what we are doing is trying to prevent flight deck FOD. In an area that dr so much attention, it should be reasonable t sume that all major areas of flight deck FOD have been addressed (and we can move into the cleanup phase). This appears not to be true. *Virtually every piece of flight deck personal gear or machinery* is laden with potential FOD.

We are usually diligent at inspecting items such as cranials, MK-1 life preservers (float coats), aviator gear, tool pouches, armament carriers, yellow gear and generally any item on the flight deck. However, this is much like trying to maintain a "lemon" vehicle. Why not get a better one? Let's take a long, hard look at *every piece* of gear/equipment that frequents the flight deck *from the initial design phase* and develop it *with its ultimate use* always in mind. It would seem few manufacturers of these items have FOD in mind. This is most likely due to Navy specifications that do not include FOD consideration when designing equipment.

If this suggested policy were in effect, would a cranial be made of so many metal nuts and bolts? Would float coats have all those metal buttons and snaps? Would a pilot's helmet have so many metal screws? Would flight deck clothing have big buttons and pockets? Probably not. Let's challenge our designers to account fully for FOD potential on all flight deck gear and equipment. The potential reward is obvious. Less personal injuries and significant material savings. Let's make the massive flight deck "pick up the pieces" of flawed gear FOD walkdown a little less fruitful.

Lcdr. G.S. Thompson
Safety Officer, VA-147

• Editor's note: Below is comment on the above topic from PRCM Aaron C. Reynolds of the Naval Safety Center (Life Support Equipment Branch, Aircraft Maintenance and Material Division).

I cannot support Lcdr. Thompson's contention that equipment manufacturers are not considering the dangers of FOD when designing their products. I work with the engineers who design flight equipment and FOD is well known and considered from all angles.

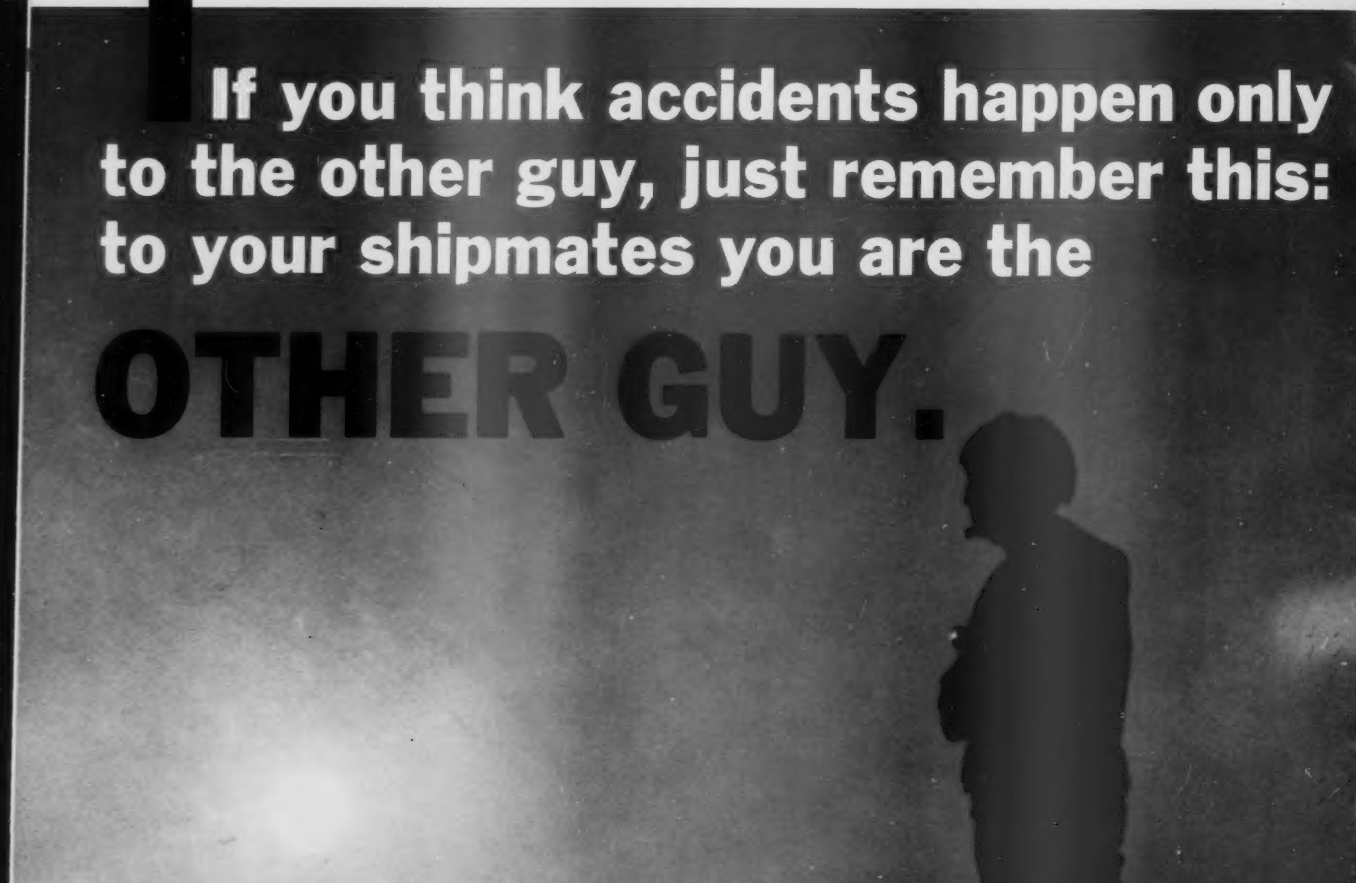
Personal flight deck gear (or machinery) is designed with the idea of preventing FOD. The following are examples:

- Tool pouches are required to have flaps and positive attaching straps, then secured with Velcro. Each pouch is required to be under the same positive tool control as all other aviation tools. (Ref: OPNAVINST 4790.2)
- Cranial helmets are designed for protection from striking the head against the aircraft; that is, flight surface trailing edges, pitot tubes, radio antennae, etc. It may be possible to build a helmet with the same protective features and without the use of snaps to attach protective shells. (Ref: NA 13-1-6.7)
- Mk-1 life preservers with pockets for attaching survival equipment, dye markers, lights, etc., may soon be procured. Periodic inspection is required to check security of closure snaps used to secure the front closure. (Ref: MIP H 402, NA 13-1-6.1)
- "Aviator gear," understood to mean aviators personal equipment, is secured in pockets or comes with straps and can be tied down to prevent loss.

Volumes are in print specifying periodic inspection/test requirements to prevent loss of items, including snaps, fasteners, etc. Lcdr. Thompson's letter is good from a philosophical viewpoint if you can imagine a FOD-free world. But the only real way to prevent FOD is to melt everything into one ball or continue to clean it up every day, prior to every launch.

RIP

THE BEST REASONS FOR WEARING SEATBELTS ARE ALWAYS GETTING BURIED.



Poster idea contributed by AO1 Dave Pulver, VP-69, NAS Whidbey Island, Wash.

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